COMMENT

Mineralogical characterisation of the complex sulphide ores from Askot, Pithoragarh District, U.P.


I wish to offer the following comments on the article:

1. Summation of modal percentages of samples Nos. 5 and 7 (Table I) gives 108.7 and 108.00 respectively, instead of 100.

2. Some of the opaque minerals reported by earlier workers from Askot have not been mentioned by Shri Acharya.

3. It is surprising how Shri Acharya has missed the evidence for degradation of tetrahedrite to chalcopyrite and gudmundite, which is a very interesting and common textural feature of the Askot ores. In fact, his Fig. 8 represents a pseudo-eutectic intergrowth between chalcopyrite and gudmundite. Some of the earlier workers had mistaken gudmundite for pyrite and now Shri Acharya has mistaken it for arsenopyrite. Granted, it is difficult to distinguish between very fine-grained arsenopyrite and gudmundite on account of their similar optical properties. When both are present in juxtaposition, gudmundite can be easily identified by virtue of its inferior polishing hardness. However, when sophisticated instruments like the SEM/EDAX system are at one's disposal, identification of gudmundite does not pose any problem.

4. Another notable absence in the list of minerals given in Table I is stannite. Fine ‘Sternchen’ of stannite are invariably associated with sphalerite stars. Now that MECL have started their operations again on the second level development at Askot, I have an opportunity to study more specimens from Askot and confirm my earlier identifications by laser microanalyses.

      I find stannite is quite rampant, rather abundant in some chalcopyrite-rich specimens, so much so, tin may be a by-product of the Askot ore. Since Shri Acharya has described sphalerite exsolution at great length, I fail to understand how he has missed the stannite starlets and also, why he did not analyse his samples for tin.

5. Laser microanalyses of the various ore mineral phases have revealed that tetrahedrite contains the maximum amount of silver (0.4-1.0%). The silver content of galena ranges from 20 to 300 ppm. However, since Shri Acharya has not noticed any tetrahedrite in the Askot ore, his remarks about distribution of silver cannot be questioned, except stating that the silver content of galena (0.855%, Table IV) is on the higher side and it is not supported by data presented in Table III. Similarly, the silver contents of sphalerite, chalcopyrite and arsenopyrite (Table IV) are all on the higher side and are not corroborated by laser microanalyses of these minerals from Askot.

      I presume that the sulphide minerals analysed (Table IV) are representative of the deposit. Laser microanalyses of several optically homogeneous galena grains have not indicated presence of significant amounts of bismuth in the lattice of galena. The rather high bismuth content of galena (9.901%) is really
surprising and makes me wonder if the galena analysed was indeed representative of the deposit and also about its purity. The average modal abundance of galena for the ten specimens given in Table I comes to 9.06%. If galena does carry 9.901% Bi, the average bismuth content of the ten samples should be around 0.89%. I am sure, whoever has analysed the complex sulphide samples (Table III) would have noticed the presence of such a large amount of bismuth in them and tried to estimate it.

The above observations hold good for arsenopyrite analysis also (Table IV), only with a greater force. The high cobalt content is not corroborated by the laser microanalyses of several arsenopyrite grains from different specimens. Cobalt is present in arsenopyrite in the range of 0.01-0.1%, but nowhere near 4.25%. The average modal abundance of arsenopyrite (Table I) comes to about 4.94%. If arsenopyrite contains as much as 4.25% Co, then the average cobalt content of the ten samples works out to 0.2%, making Co a candidate for by-product. Whereas, the maximum cobalt content of the seven samples (Table III) is given as 0.0082%. Obviously, something is wrong somewhere.

An even more glaring anomaly is noticed in the case of the gold content of arsenopyrite (0.181% Au, Table IV). Again, I doubt if this arsenopyrite is representative of the deposit or if the analysis is of a pure arsenopyrite fraction/crystal. With an average arsenopyrite abundance of 4.94% (Table I) and gold assay of 0.181%, the average gold content of the ten samples should be around 89 gpt, which would make Askot an extremely rich gold mine. Even if we allow for five times dilution during mining, the ROM ore should assay about 18 gpt gold, which should still make Askot a very attractive gold mine. Alas, such is not the case, although arsenopyrite is present as a minor to major opaque mineral constituent in most of the ore specimens from Askot.

I have taken the trouble to point out these anomalies, since the author’s data have a direct bearing on the economics of mining of the Askot ore.

REPLY

I thank Dr. R. Seetharam for his keen reading, interest and comments on my work. Following are the clarifications on the points raised by Dr. R. Seetharam.

1. Pyrrhotite percentages in samples Nos. 5 and 7 (Table I) should read as nil and 0.42 respectively. The errors are due to typing mistakes. The error is regretted.

2. The minerals mentioned by Dr. Seetharam have not been observed by the author and hence not reported in the paper. However, Seetharam, 1981 has been referred. The omission of those minerals in the text is unintentional.